

CIA/CAMBODIA ✓

# **EXPLORING NUTRITIONAL HEALTH ISSUES IN RURAL CAMBODIA**

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## ABSTRACT

The University of Toronto's Centre for International Health is currently developing a partnership with the Chamdar Bei community towards improving health care delivery and child nutritional health status. The project aimed to identify nutritional health concerns facing children under five years, with contributing factors such as food insecurity; breastfeeding practices; complementary feeding; and food biases. 50 mothers were randomly identified with children less than 60 months of age as subjects from the village. The research was conducted in cooperation with the regional government, local health centre, village chief, and facilitated by a health care worker and Cambodian medical student.

Over a six-week period, anthropometric assessment of children's nutritional status was conducted, and was complemented by a dietary evaluation addressed to mothers. Further contextual analysis into the nutritional health situation in rural Cambodia was gained through interviews and resources provided by local health workers and a long-term nutritional advisor from a local non-government organization. Focus group sessions provided the opportunity to give feedback on the findings and explore issues that arose during the course of the interviews, including food taboos, breastfeeding, and identifying individuals in the family at risk of malnutrition.

Food insecurity proved impact significantly on food intake, with most mothers reporting that current crop yields were insufficient to meet their families' dietary needs. Most newborns were fed sugar or plain water following delivery, with some beginning to be breastfed only after the third day of birth after the mothers had rid of colostrum. The age of introduction of complementary foods varied throughout the village, with many mothers choosing to begin supplementation at six months. In their interactions with health care workers, few mothers reported being provided with nutritional information for their child. Maternal nutritional practices were found to be largely influenced by elders and family members in the village.

The strength of this experience was in its relationship with local partners. Mothers have since expressed an interest to the local health centre on learning about healthy foods for their families and especially their babies. As the Centre for International Health and local Cambodian leaders partner to identify and address the needs of children at risk of malnutrition, these findings provide a basis for furthering the collaborative efforts and empowering mothers with the knowledge and resources to protect their children's nutritional needs.

## **BACKGROUND**

In 2002, the University of Toronto's Centre for International Health began collaborating with ROSEcharities, a surgical humanitarian agency based out of Phnom Penh. Together, they are establishing a primary health care initiative to promote and enhance health services to Cambodians. This research project focused on mothers and their children of the Chamcar Bei village, with the aim of assessing their nutritional health status and maternal nutritional health-seeking behaviours.

### **Situation in Cambodia**

Nutritional problems in Cambodia have been closely linked to the years of war, trauma and economic embargo that characterised the country during the revolutionary regime of the Khmer Rouge (14). The infant mortality rate was 125 per 1000 live births in 2000, and there has been no evidence to indicate an improvement in this measure. Until recently, Cambodia's political instability prevented the use of any trend analysis, with a particular lack of specific nutritional information. However, a 1999 study identifies approximately 75% of children under five years of age as having anemia (5).

The high rates of malnutrition likely reflect an inadequate consumption of micronutrient-rich foods. Although breast milk is considered the most important source of iron for children under six months of age and has been recommended as an exclusive source of nutrition for these children (14), less than 10% of Cambodian mothers were found to be exclusively breastfeeding their children during the first six months of life (10). The World Health Organization (WHO) also recommends that breast milk be supplemented with appropriate and adequate food to promote a child's development. While this appears to have been followed within Cambodian families, the high prevalence of anemia among children 6-9 months suggests that the complementary foods are insufficient in providing the necessary level of micronutrients to promote growth and development.

Iron-deficiency anemia (IDA) is the most common nutritional deficiency in the world, and is prevalent in countries where grain is the mainstay of the diet or where meat is scarce. IDA has been found in areas of rural Cambodia where there is a concomitantly high prevalence of malaria, which exacerbates anemia due to increased hemolysis. Moreover, the prevalence of anemia in Cambodia is influenced by seasonal variations, which impact the population's capacity to produce and consume iron-rich foods. In Kampot Province, which borders the municipality of Kep, there has been evidence of chronic stunting due to extreme seasonal variation, which results in food security lacking for three to four months every year (2).

Chamcar Bei was an area created in 1995 by the government, as a remote settlement of former Khmer Rouge soldiers deep in the mountains bordering Vietnam. The village earned its name from three large pepper plantations ("Chamcar" meaning "plantations" and "Bei" meaning "three"), but is rich with vegetable, fruits and rice plantations. After the government began to get involved in 1995, dirt roads and bridges were built through the forests, and eventually a number of Khmer families moved to the area, building a population of 2339 people and nearly 300 children under five years, according the village chief and local health care centre, which recently vaccinated the children in the area (7, 13). The health issues identified in this area include a lack of health knowledge and high incidence of malaria. The village chief and medical

director of the local health centre, Pongtek, welcomed the Centre for International Health's initiative on nutrition as means of increasing awareness and knowledge about nutritional health issues for mothers with children under five years in Chamcar Bei.

## **METHODOLOGY**

The village of Chamcar Bei was chosen from within the operational district of Kep, the primary site of the CIH initiative in Cambodia. Fifty children were identified as subjects from this area, all of whom were less than sixty months of age. The medical director of Pongtek Health Centre, Dr. Lim Ang, and the village chief of Chamcar Bei were approached for their consent to mothers' participation in the study, and had the methodology explained through Ly Sony, an interpreter and final-year medical student from Phnom Penh. Our local counterpart was Pich Bopha, a community health worker from Pongtek Health Centre and resident of Chamcar Bei. She was familiar and trusted by the community for her recent efforts to vaccinate all the young children in the village.

### **Nutritional Assessment**

Assessment of nutritional status was based on the following two parameters: anthropometry and dietary evaluation. The anthropometrical component involved determining the weight, height and mid-upper arm circumference of each child to appreciate the child's growth and development (1).

Dietary evaluation was conducted with mothers in their homes. The questionnaire was adapted from previous research on food security in Ghana (15), nutritional studies in rural Cambodia and personal communication with Dr. Philippe Longfils, a long-time nutrition advisor with a German-based non-government organization, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ)(8). The purpose of this questionnaire was to identify food security concerns facing the family, as well as the knowledge, attitudes and practices (KAP) of mothers with children less than five years, in order to gain insight into complex issues that may have impacted a child's nutritional health.

With open- and closed-ended questions, the interviews lasted between 30 and 45 minutes. The questionnaire, which was finalised in Kep in collaboration with local colleagues, aimed to be of appropriate length and language, relevant and culturally sensitive. Some areas addressed in the questionnaire included the use of supplement foods alongside breastfeeding practices, the incorporation of iron-rich foods in the child's diet, availability of the main food groups in the Kep area, seasonal variations in food security and access, and an assessment of the child's dietary intake in the last seven days. Since Khmer is the most widely spoken language in Cambodia, the interviews were conducted by the counterpart and promptly translated by Ms. Sony.

### **Focus Groups**

A focus group is defined as a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the topic that is the subject of the research (11). The main purpose of the focus group is to draw upon participants' attitudes, beliefs, feelings, experiences and reactions in a way which would not be feasible using one-on-one



interviewing, and draw out multiple views and emotional developments within a group context (4). While the topics are supplied by the researcher, the insight and data produced by the interaction between participants distinguishes focus groups from group interviewing, where the emphasis is on individual responses to specific questions. The moderator's role involves promoting debate through open-ended questions, challenging participants to draw out differences in opinions, and keeping the session focused (4).

In the context of nutritional health research, a number of focus group sessions were elicited following the interviews to explore common issues and give feedback on the findings. The information gathered from this group was helpful in understanding cultural beliefs surrounding maternal health, food biases and malnutrition, and in turn was beneficial to participants, as they had the opportunity to collaborate with the researchers. While some were shy, the immediate feedback from the sessions was that they appreciated the opportunity to express their concerns about their children's health and share information about their nutritional practices with other mothers and the research team.

The invitation to participate in the focus group was extended to all mothers who had been interviewed. We conducted four focus group discussions and in which a total of 35 mothers participated. The questions focused on the following broad areas:

1. Maternal knowledge of healthy foods and foods to stay away from during pregnancy, following delivery and during lactation period.
2. Impact of nutrition on health: family members at risk of malnutrition; effect of dietary habits on health.
3. Breastfeeding practices
4. Role of *ang pleung* ceremony, performed by most mothers interviewed.

While areas 1, 2 and 3 had been addressed in the interviews, it was hoped that a group discussion would yield more insight into maternal knowledge, attitudes and practices with respect to their children's nutritional health. Area 4 was addressed primarily because it is a specific tradition performed by most Khmer mothers following delivery, and has very little literature relating to infant feeding practices during this period.

## RESULTS

### Identifying Data

The study yielded information on the nutrition practices and health status of 50 children. Of these, the age range was 0 to 57 months (see Table 1), with 17 girls and 28 boys.

Table 1: Age of children included in study

Age	Number of children
0-11 months	20
12-23 months	11
24-35 months	11
36-47 months	6
49-59 months	2

Of the mothers interviewed, 23 had other children under five years of age; 20 had one child while 3 had two other young children. The educational status of the mothers ranged between no schooling to completion of 9<sup>th</sup> grade. Of those who had attended school (N = 34), 26 stopped at the primary school level, and 6 of these lacked fluency in reading or writing in Khmer. 7 had stopped at the middle school level, and were fluent in Khmer.

### Food Security

Food security in the area of food production and availability was addressed through the questionnaire, and the results are summarized in Table 2.

Table 2: Food security in the area of crop yield and distribution

	Rice (N = 38)	Vegetables (N = 30)	Fruits (N = 27)
Produced last season <sup>1</sup>			
Range	3-50 bags		
Average	15 bags		
Mode	10 bags		
A lot		4	2
A few		18	6
A little/none		5	4
Just started growing		4	16
Yield Variance			
More in wet season	34	21	8
Same in both seasons	2	1	1
More in dry season		5	3
Crop distribution			
Kept all for family	35	10	4
Kept more than sold		2	
Kept = Sold		11	7
Kept less than sold		4	1
Sold all	1		
Sufficient for family?			
Yes	8	9	4
No	41	21	22
Source of supplementation <sup>2</sup>			
Market	42	46	42
Relatives	4	2	2
Neighbours	2	1	1

<sup>1</sup> Amount produced for fruits and vegetables was difficult to quantify in one set of units for many families, with some mothers giving the amount in riels received or baskets produced. A more qualitative response was therefore sought; this was not used for the rice crop, since mothers were able to give a consistent figure in # bags.

<sup>2</sup> Not exclusive; thus, some mothers supplemented their foods from both market and relatives, or market and neighbours.

Table 3 lists the various vegetables and fruits cultivated by the respondents. The numbers are not mutually exclusive, and thus some families were found to grow both cucumbers and wintermelon, for example. The table is helpful in appreciating the variety of vegetables and fruits available in the Chamcar III community.

Table 3: Vegetable and fruit crops.

[illegible]

Table 4 summarises the number of animals raised by respondents. This table includes respondents with multiple animals and purposes, and therefore illustrates the variety and availability of animals raised.

Table 4: Animals Raised (N = 46)

	Field/home	Sale	Consumption
Cattle	24	1	1
Chicken		19	35
Dog	13		1
Duck		2	8
Pig		27	3

None of the respondents raise fish; the most common animal raised was the chicken, and the purpose was more often for consumption, as contrast to the pig, whose main purpose was for sale, or the cattle and dog, used for the field and to guard the home, respectively.

In the last one month, 18 families have had increased difficulty in accessing all of rice, vegetables, fruits, meats and fish, whereas 8 families have had difficulty with accessing one or more of the foods (see Table 5).

Table 5: Difficulty accessing specific foods in the last one month

Foods	Number of respondents
Rice	26
Vegetables	27
Fruits	30
Meats	25
Fish	26

This question presented a problem for some respondents, who felt that access to these food groups had been difficult for more than one month, attributing the long-term difficulty to (for example) lack of money or the recent move to Chamcar Bei. The question was soon adapted to this context to determine *increased* difficulty in accessing specific foods in the last one month. Those who responded “always difficult” were grouped with those who said “not difficult” as the question was seeking for information on acute food insecurity. 12 respondents felt that the problem was within the community, whereas 16 felt that the problem was specific to their family.

The reasons for increased food insecurity in the last one month were varied, and are summarized in Table 6. The most common reason was lack of money to access foods, followed by a lack of crop yield due to the dry weather<sup>3</sup>. 26 mothers believe that, in the past year, the income has been insufficient to meet the family’s needs and expenses, although this number did not correlate with their responses to short-term food accessibility, as 10 mothers who felt that their income was able to meet the expenses also had increased food insecurity in the last one month.

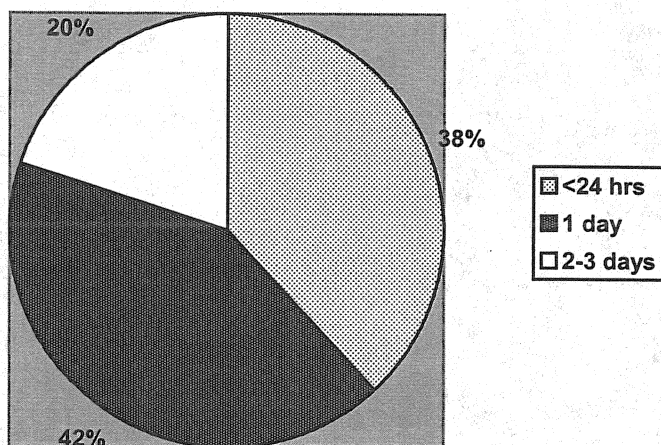
Table 6: Reasons for increased food insecurity in the last one month (N = 32)

Reason	Number of respondents
Weather-related issues	
Increased weather fluctuation	2
Too dry	6
Too wet	2
Field-related issues	
Crops damaged by insects in the fields	2
No land on which to grow crops	2
Just started growing crops	2
Family-related issues	
Not enough money to access foods	16
Husband left the family	2
Other issues	
Cannot find fish	1

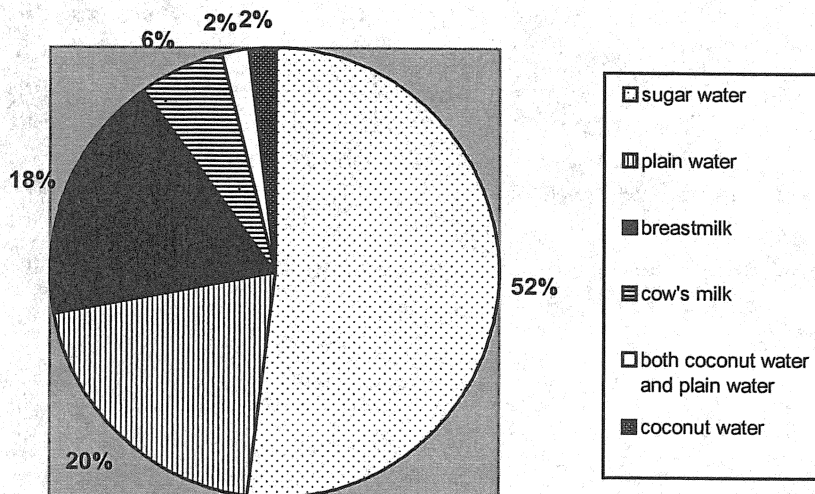
<sup>3</sup> These responses were derived before a five-day monsoon rain; it can be debated whether these families would still look to the dry weather as reason for food insecurity.

## Health of Child Under Five Years

Graph 1 summarises the time after delivery when the infant was first fed, and Graph 2 indicates what food was initially given.



Graph 1: Time of first feeding (N = 45)

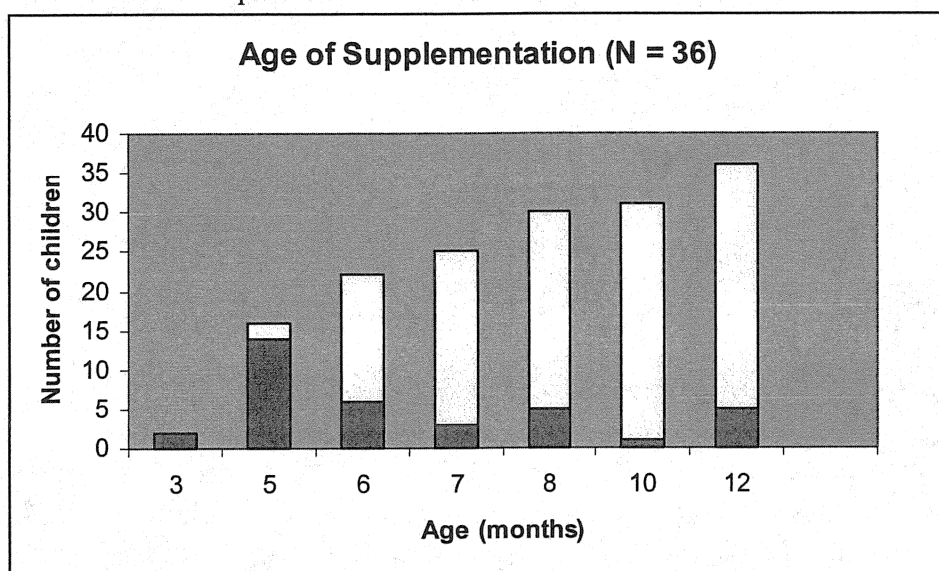


Graph 2: First foods administered to newborn infant (N = 45)

14 mothers fed their baby breast milk only after the third day. When this was raised in the focus group discussions, a number of mothers claimed that they could not secrete breast milk on the first or even second day, and thus fed their newborn babies sugar water or plain water as an alternative. By the second or third day, when the mothers were able to secrete, most began feeding their children breast milk exclusively.

Following the delivery of their child, 49 mothers participated in the *ang pleung* ceremony. With a duration ranging from one day to one month, 42 mothers had their newborn infant present with them. 7 mothers did not have their babies with them, and so, during this time, the babies were fed one or more of sugar water, plain water, coconut water, honey or breastmilk when they cried.

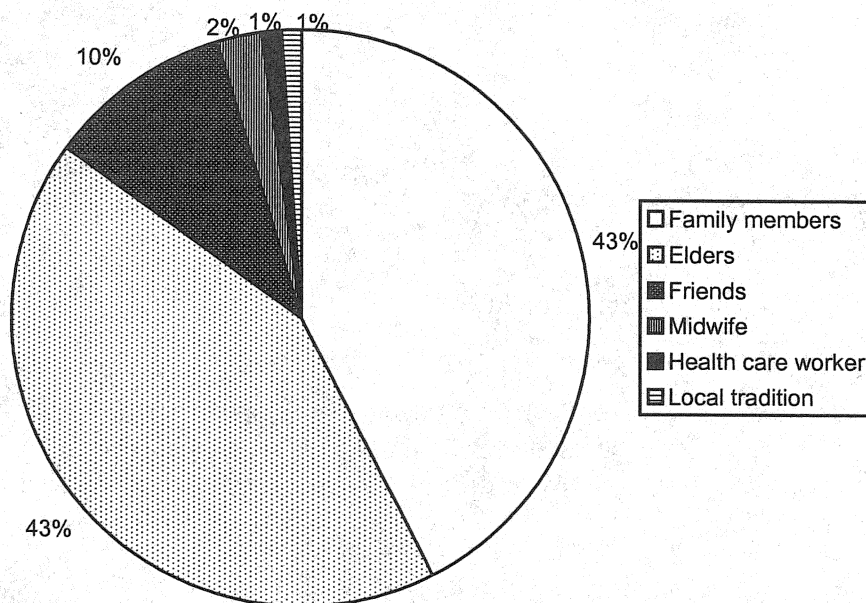
The ages at which complementary foods were introduced varied across the respondents, and are summarized in Graph 3.



Graph 3 shows that, by the age of 12 months, all the children in the study had been introduced to complementary foods. Of the 36 children receiving complementary foods, 16 were exclusively fed a rice-based porridge called *bobor sor* until they began to teethe. The other 20 children were fed *bobor sor* with meats (N = 7), fruits (N = 8), and vegetables (N = 8) that were ground or chopped up to facilitate mastication. 34 children had already received their first set of teeth; of these, 32 now eat all of rice, fruits, vegetables and meats. One child continues to be fed *bobor sor* exclusively, whereas another is fed only rice and fruits.

Graph 4 illustrates the sources of knowledge of mother's nutritional practices and dietary habits.





Graph 4: Sources of knowledge of nutritional health.

From Graph 4, the majority of mothers received much of their knowledge from elders and family members, and especially mothers. Interestingly, only one mother claimed to have received nutritional health information from a health care worker. Similarly, during visits to 31 of the respondents' homes, only 7 health care workers discussed food preparation and appropriate dietary habits. On visits to the health centers (N = 22), 6 respondents discussed nutritional health practices with the attending health care worker.

Of the 50 mothers interviewed, 25 had radios in their homes and 9 had television sets (7 mothers had both in their homes).

### Dietary Habits

The food taboos yielded interesting findings that relate to cultural practices found throughout the village. A full table of the food biases during pregnancy, post-delivery, lactation and for the baby can be found in the appendix. Of particular interest is the significant number of mothers who did not eat fruits and vegetables for at least one month immediately following delivery. As well, many mothers abstained from specific fruits and vegetables (such as eggplant, taro and mango) during pregnancy and/or throughout lactation. These findings were further explored in the focus group discussions (see below).

### Anthropometry

28 children at or above the age of 12 months had their mid-upper arm circumference (MUAC) measured. The values ranged from 129 to 166mm, with an average of 146mm. Height and weight measurements were taken from 47 and 46 children respectively (of the others, one was not around during and after the time of the interview, one was a newborn and considered too young to be weighed, one was sleeping and the last protested profusely against the process).



Their anthropometric values were plotted on the UNICEF height-for-weight wall chart. For 14 children, their weights were between 90-100% of the reference weight-to-height measure. The weights of 15 children were between 80-90%, and the lowest weights measured were in 5 children at 70-80% of the reference weight-to-height measure. 3 children had their measurements outside the range of the chart.

### **Focus Group Discussions**

35 mothers attended the five focus groups, which were held in the week following the one-on-one interviews. The sessions focused on three main areas:

1. Knowledge about healthy foods and dietary habits
2. Impact of nutrition on health and malnutrition
3. Breastfeeding and complimentary feeding practices

#### ***1. Knowledge about healthy foods***

The participants agreed that healthy foods included rice; vegetables such as carrots, potatoes, greens; fruits such as jackfruit, apples; eggs and meat, including liver. Participants decided the meals based on their preferences for the vegetables or fruits, or on food availability, be it in the field or at the market.

During pregnancy, healthy foods included fruits, such as papaya or rambutan; green vegetables; and meat. Mothers noted a change in their diet, but this varied between individuals. Some mothers ate less rice because of a loss of appetite caused by morning sickness; others ate 2-3 times more food than before their pregnancy. One mother started eating goose eggs because she believed it would make her baby clever, whereas others took to drinking 2 glasses of wine everyday, mixed with traditional medicine, to ease the eventual labour and delivery.

Unhealthy foods included taro, which would cause the baby to itch; banana flower, which would make the delivery difficult; and sugar cane and unripe banana, which would make the delivery "sticky".

Following delivery, most participants ate only meat and rice for the first month. On the advice of elders, the mothers abstained from vegetables and fruits, since these foods are believed to cause edema or diarrhea. One mother followed this dietary behaviour even though it contradicted her physician's advice of not staying away from any foods. The midwife of one of the participants advised her to eat meat, but to abstain completely from vegetables. Another mother argued that, if she had delivered her baby in the hospital, she would have eaten all kinds of foods because she would have received the medications necessary to improve her health following labour. A number of participants drank one glass of alcohol with each meal in order to lighten their skin, increase their appetite, and increase the rate of bleeding following delivery.

During lactation, participants ate green vegetables and fruits (after the initial one-month abstinence), meat and rice. They stayed away, however, from eggplant, which is believed to cause anaemia, and bamboo shoots, which, when eaten following injury, can cause tetanus.

## **2. Impact of nutrition on health**

Malnutrition was defined only by some mothers; others had never heard of the term before. Their definitions included insufficient and/or irregular food intake; lack of money to buy food; and individuals who, with irregular eating habits, are not clever and fall ill more often.

When asked which population was at risk of malnutrition, most participants readily identified the mother, who “needs to eat more food when pregnant because she is also feeding the baby”. Interestingly, some participants identified the mother as being the sole family member at risk of malnutrition, as she “has no money with which to buy food at the market, but she’s the only one to get pregnant and needs more food to eat.” Moreover, after delivery, “if the mother does not eat healthy food, the baby will get sick and thin since there is insufficient breastmilk”. Still others identified the pregnant mother as the only individual at risk of malnutrition, since “she needs to eat a lot more food for the baby”.

Of the mothers who felt that a child was also at risk of malnutrition, they defined these risks as including the ingestion of “hot foods” such as lychees, sugar, chilli, corn. After lactation, babies may become malnourished because “there is no money to buy food to eat”, or “if the mother feeds the baby irregularly because she needs to work”. Conversely, babies can become healthy if the mother “eats a lot of healthy foods, for example meat, and the baby is given *bobor sor* after six months of age”.

A number of connections were made during the focus group discussions about the impact of a child’s health by the mother’s nutritional habits. For one, it was agreed that, if a mother doesn’t eat well during pregnancy, “the baby will be born thin”, and during lactation, if she doesn’t eat well while lactating, “then the milk will lack nutrients”. Moreover, the mother “can pass unhealthy foods through the breastmilk”; for example, sour foods in the mother can lead to diarrhea in the baby.

## **3. Importance of breastfeeding and supplementation**

A number of participants could not give any reason as to the importance of breastfeeding. The general opinion was that breastmilk is important because “the baby lives by it”. They felt that it was important for the mother to “eat healthy foods like fruits and vegetables, which will get through the breastmilk to the baby”. When asked why mothers supplemented the breastmilk, most claimed that they gave water because the baby was thirsty. They fed their newborns boiled water following delivery because breastmilk didn’t come by the 1<sup>st</sup> hour, or even the 3<sup>rd</sup> day for some mothers (the sugar was added to sweeten the taste).

The role of colostrum in children’s health was specifically addressed, and generally described as being important because it “gives good health to the baby”. However, some participants claimed that colostrum was not important because “it seems troubled, not clear, and may give the baby nausea”. While some had been informed by a midwife and health care worker that colostrum was good and should be fed to the baby, others had been told by their elders to “throw away the colostrum”. Some mothers believed that they had colostrum for 7 months, while others claimed that it was available for only 2-3 days. They described the fluid as being clear and with “lots of vitamins”. Moreover, “if baby has an eyesore, colostrum can be put on the eye to cure the pain”.

#### **4. Ang Pleung Ceremony**

This cultural tradition is performed immediately following delivery to protect the mother from sickness, as the mother is *sesaikeeye* (more susceptible to illness following delivery). The new mother stays in bed throughout the duration of the ceremony, which can last for 3 days or more. The focus group participants gave more insight into this tradition, and claimed that *ang pleung* “helps to avoid body aches when the mother gets older”; makes the mother more healthy by “restoring energy to decrease the [post-partum] pain”; “makes [her] skin look good [as told by a traditional healer]; and “prevents numbness in arms and legs, as well as general pain”. One mother had been discouraged from participating in the ceremony by a health care worker who was concerned that it would “prevent postnatal bleeding”, but this did not occur. For those who kept their babies near them, they had more wood put on part of the bed to protect the baby from the fire. While some mothers had sugar water given to the baby for the 3 days that they were in the fire, other mothers who also did not keep their babies with them nonetheless breastfed whenever their babies cried.

## **DISCUSSION**

### **Context of Analysis**

Through discussions with the village chief, the director of Pongtek Health Centre and the first village chief of Chamcar Bei (3, 7, 13), we learned that the settlement was established at the end of 1994, but has since divided itself into two smaller villages to facilitate communication. Before this, 95 former Khmer Rouge soldiers and their families were settled in Chamcar Bei. Since recognition by the government, a number of families have moved into Chamcar Bei that were not politically involved during the Khmer Rouge regime. The community spirit has been friendly since then, with no discrimination between those who were soldiers and not. The immediate health issues facing the growing community included a lack of access to health centres since they lacked a route to the main road; a high incidence of malaria, and a lack of knowledge to develop their land into a fertile source of nourishment.

In 1999, the then-village chief provided the USA-Cambodia Cooperation (UCC) with land to develop the Chamcar Bei area. In return, the UCC provided food to children and employment to mothers in the area of animal raising. The organization was expected to help the community by teaching members how to cultivate crops and improve the nutritional health within families. The UCC did provide nutritional information for children, but this was at school for children over five years, and therefore did not engage the parents or children who were unable to attend school (13).

The current education status of children is reported to have improved by the summer of 2003, with most of them attending school. The former village chief implemented an adult education program in 1999 for individuals who could not attend school during the Khmer Rouge regime and sought vocational training in areas including agriculture. Supported by UNESCO, the school was to open in August of 2003.

The Cambodian government recently proposed a 2003-2007 Cambodian Nutrition Investment Plan (CNIP) with a proposed investment of \$41.1 million to promote “nutrition-relevant aspects

of development” (9). The plan aims to cover both rural and urban areas and to address the high rates of child and maternal malnutrition and deaths affecting all provinces in Cambodia. The focus of the CNIP is on mothers and children under two years of age with follow-up interventions until the age of five years, an optimistic action by the government towards an issue that has long-impacted families across the country. It is hoped that such efforts will indeed reach the rural communities, including Chamcar Bei, which has been trying to address significant nutritional health concerns.

### **Food Security**

Chamcar III consists of fertile land that is farmed by most families in the community. However, this enterprise does not correlate for high food security within the families. In fact, of the participants surveyed who owned rice fields, vegetable crops or fruit trees, more than one half found the yield to be insufficient for the family’s needs. This finding parallels the fact that, for those growing vegetables and fruits, most of the yield is sold rather than kept for the family, and usually due to financial needs. Another interesting finding was that, while most families kept the rice yield for themselves, they still found the quantity insufficient to meet their needs.

There was also an issue of seasonal variation, with an increased yield during the wet than dry season. Of note, these interviews were performed during the wet season, and may have affected the mothers’ responses with respect to quantifying their yield, since many did not remember the amount of fruits or vegetables harvested from the year before. Those who found the yield to be insufficient supplemented their dietary needs at the market, and rarely through the crops of relatives or neighbours.

The most significant impact of food security was related to financial need, followed by weather conditions. There were very few land issues deemed as cause for food insecurity. Thus, in developing strategies to address the important issue of food security, it is important to appreciate the impact of financial resources (or lack thereof) on food availability. The information relating to animal raising and crop cultivation was difficult to interpret and relate to the nutritional findings, and it is hoped that, in future studies, these areas will be appropriately addressed. Previous research into the determining factors of household’s food security has focused on the impact of socio-economic environment, in particular population pressure, available potentials and resources in the area, educational and skills levels, and the social safety net provided by the respective government (2). These areas would be worthwhile to explore in the Chamcar Bei community, in which a common complaint was in the lack of government response to local needs.

### **Health of Child Under Five Years**

Most of the participants’ children were first fed within the first two days of life, which still enables them to receive the mother’s colostrum to help deal with pathogens for the first six months of their lives. Interestingly, most of the first fluids administered were not breastmilk, but rather water. These newborns therefore risked contracting a water-borne infection (although most mothers boiled the water before feeding the baby) through sugar or plain water, whereas those who were fed coconut water did not run this risk, as its containment within the coconut

prevents infection of the liquid. Cow's milk, fed to some newborns, has been shown to be less nutritive and even more harmful than breastmilk since it has excessive levels of iron (15).

The *ang pleung* ceremony did not seem to affect the breastfeeding practices of a significant number of mothers, all of whom kept their babies with them throughout the duration of the ritual. However, those kept away from their mothers were fed less often and sometimes with water by relatives, which arguably increased the risk of malnutrition for the newborn. Following the *ang pleung* ceremony, most mothers began breastfeeding their babies exclusively, recognising the importance of breastmilk for their child's development. However, some continued to feed water because they worried that the infant was not retaining enough fluids, although this practice has not been supported by literature.

The Helen Keller International/Cambodia Nutrition Reference Manual is an excellent source of information, providing examples of foods found throughout Cambodia that can protect the nutritional health of families and especially children less than five years of age (6). Most mothers followed general convention and began supplementing their infants' diet with solid foods between 6-7 months. The mothers who began feeding complementary foods at less than six months did not necessarily increase their babies' risk of malnutrition since they introduced nutrient-rich foods such as meats and vegetables, but may have increased their children's risk of developing diarrhea, as other foods and fluids may have been contaminated, and the baby's immune system would not have been developed to fight microbes (6). There is, however, concern with the finding that most mothers began supplementation with only *bobor sor*, a rice-based porridge without many nutrients. Literature has shown that rice contains excessive amounts of phytate, which binds iron in the intestinal lumen and impairs its absorption (12) and can therefore increase risk of iron-deficiency anemia. While most children began eating meats, vegetables and fruits upon teething, one can argue that there was a period that they did not receive adequate nutrients to promote growth and development.

While the dietary evaluation was helpful in yielding information about nutritional health knowledge, there was concern over the use of anthropometry as a tool for determining the child's health status. Some children who had been ill prior to measurement fell within the yellow/red areas of the chart, whereas others in these "zones of concern" did not have a recent history of illness. Mothers were informed of their child's status during the focus group discussions, and the overwhelming response was surprise followed quickly by anxiety. Two distinct problems arose with this information on the part of the research team: as an exploratory research initiative, the design of the study was not intended to include educational component to provide mothers with nutritional information, and so disclosing the anthropometric evaluation was not necessarily helpful because we were limited in our capacity to provide mothers with knowledge on how to improve their child's health status. Moreover, the merits of a one-time anthropometric measurements are debatable, as there is more usefulness in charting the child's height and weight over time, as this process can better identify stunting or failure-to-thrive, which are common outcomes of severe malnutrition (2).



### **Maternal Nutritional Health Knowledge**

The food biases during and following pregnancy gave insight into maternal nutritional knowledge and practices. For example, eggplant was believed to cause anemia, and so most mothers stayed away from this vegetable, which was not necessarily an issue since it is 90%-water but nonetheless a source of fibre, calcium, potassium, folate and other vitamins and minerals. Of particular concern, however, was the lack of nutrients, namely from fruits and vegetables, following delivery. During this one-month period, many mothers ate only meat and rice. There has been little research into the impact of this specific nutritional behaviour on maternal health and, through their breastmilk, the health of their newborns.

Mothers developed their nutritional health practices and food biases primarily from their mothers and elders in the village. This rich tradition of passing health knowledge down generations has a strong influence in communities where education and trustworthy sources are not easily accessible. In an era marked by political instability, many of these mothers as young girls were not encouraged to pursue their education, whereas those who had had more years of schooling tended to have a more informed nutritional health practice within their families. The latter group was in the minority in our research.

Even with this strong oral history of nutritional behaviour, mothers came to the focus group discussions hoping to address their concern regarding their children's frequent fevers and illnesses. They expressed an interest in learning about specific available foods that would make their children healthier. With these findings, it becomes important to not only seek responses from the community but to also share the findings with avenues for addressing the concerns that arise during the course of the study, for example, developing programs to promote appropriate nutritional health behaviour. In this situation, it is critical that there be engagement not only among mothers but also among their relatives and elders within the village, as the latter appear to strongly influence the nutritional health practices of mothers within their families.

### **Role of Health Care Worker, Research Team**

In most homes, the health care worker (HCW) was well received and respected. The meaningful communication between the HCW and family members is helpful towards encouraging and establishing nutritional practices within the home. The mothers tend to trust the opinions of the HCW, who has developed a long-term and reliable relationship within the community through childhood vaccination strategies and by running an informal pharmacy within his/her home. Our role as researchers was not necessarily to educate the community, as we had relatively little understanding of the networks of communication within the village. The role of a HCW like our counterpart, Ms. Bopha, in this case, was to act as facilitator not only between the research team and general population, but also between the goals of the nutritional health initiative and the mothers actively engaged towards them.

## RECOMMENDATIONS

As an exploratory survey within a community unfamiliar to research teams, it was difficult to address more issues within the timeframe and constraints of the questionnaire. However, the following recommendations may be useful for future researchers hoping to address nutritional health issues within Chamcar Bei:

1. Run the questionnaire again with a focus on food biases during pregnancy, post-delivery and lactation.
2. Assess child's haemoglobin levels through a HemoCue-type methodology.
3. Assess child's anthropometric status (height and weight, and mid-upper arm circumference in children older than 1 year) at the start of the study and every 4 weeks thereafter (for a minimum of two series of measurements).
4. Where a child is identified at risk of malnutrition, consider administering Supplefer Sprinkles for a short course of 4-6 weeks (proven benefit at 4 weeks) (15).
5. Address food biases (where they conflict with positive nutritional health behaviour) and nutritional health issues through focus group discussions and other visual education tools; encourage mothers, relatives, elders and other influential members of the community to attend, with the hopes of increasing awareness and understanding of the critical nutritional issues for mothers and children under five years.

The strength of this exploratory research experience was in its relationship with local partners. Mothers have since expressed an interest to the local health centre on learning about healthy foods for their families and especially their babies. As the Centre for International Health and local Cambodian leaders partner to identify and address the needs of children at risk of malnutrition in Chamcar Bei, these findings provide a basis for furthering the collaborative efforts and empowering mothers with the knowledge and resources to protect their children's nutritional needs.



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